REMARKS

In the Office Action mailed February 23, 2005, claims 18-23 are pending in the application with claim 22 allowed and claims 18-21 and 23 rejected.

In view of the RCE filed herewith, Applicants respectfully request reconsideration of the subject application.

Claims 18-21

Regarding claim 18, the Office action relies on a combination of Suzuki et al. (U.S. Patent No. 6,311,480) and Miyata et al. Applicants respectfully disagree.

However, before describing the failure of the asserted combination, Claim 18, and its advantages, are briefly summarized. Claim 18 claims:

> 18. An emission control system for an internal combustion engine, comprising:
>
> a NOx absorbent disposed in an exhaust passage of the internal combustion engine that stores and reacts NOx under certain operating conditions;
>
> a NOx sensor disposed in the exhaust passage downstream of the NOx absorbent, a first output of the NOx sensor corresponding to a NOx concentration of exhaust gas flowing out of the NOx absorbent and a second output of the NOx sensor corresponding to a oxygen concentration of exhaust gas flowing out of the NOx absorbent;
>
> a controller calculating an operating condition of the internal combustion engine and determining a difference of the output value of the NOx sensor from a predetermined value when preselected engine operating conditions are met and determining degradation of said NOx sensor based on said difference determined during said preselected conditions; and
>
> said controller further indicating whether predetermined engine operating conditions are present, and in response to said determination, adjusting a fuel injection amount into the internal combustion engine based on said second output.

Applicants' approach provides significant advantages over any of the applied references. In particular, by operating according to claim 18, inaccurate engine control is reduced by determining degradation in a NOx sensor having a first and second output signal (e.g., a NOx

output signal and an oxygen output signal). Furthermore, such operation provides accurate air-fuel ratio control by utilizing the oxygen output signal from the sensor for adjusting fuel injection into the engine. Applicants' specification is the sole description of a method that advantageously combines all of this functionality and structure without requiring any additional downstream sensors.

Despite the unique approach taken by Applicants, the Office action has applied a combination of references in an attempt to show all features of Applicants' claim 18. As will be discussed below, the only reasonable explanation is that the Rejection has impermissibly used Applicants' specification as a road map for picking and choosing from the prior art. And even then, the asserted combination still fails to show all claimed elements.

Suzuki et al. and Miyata et al. teach away from claim 18.

Applicants first wish to stress that Suzuki et al., the primary reference, shows two separate sensors located downstream of device 7. Specifically, Suzuki et al. shows both an air-fuel ratio sensor (31) and a NOx sensor (33) in the same general location. The Rejection has alleged that it would be obvious to replace these two separate sensors with the sensor of Miyata et al. "since the application thereof would have provided a less complex exhaust gas purification system by eliminating the downstream air-fuel sensor." Unfortunately, the Rejection has ignored the technical teachings of the references and thus reached an erroneous result.

To understand why this is so, it is important to first review the method taught by Suzuki et al., which relates to correcting the NOx signal. Specifically, Suzuki et al. make clear that the deviation of the NOx sensor output is detected only during specific conditions, one of which is that the catalyst device has not deteriorated. To determine whether the catalyst is deteriorated,

Suzuki et al. rely on the air-fuel sensor (31), which is assumed to be indicative of exhaust air-fuel ratio.

As such, Suzuki's NOx sensor correcting method utilizing an air-fuel ratio sensor only makes sense if one assumes the air-fuel ratio sensor (31) is functioning properly (so that it is possible to correctly determine whether the catalyst has deteriorated). Applicants respectfully submit that this is why Suzuki et al. specifically teach that a separate air-fuel ratio sensor (31) should be positioned in the same location as the NOx sensor. Otherwise, if a single erroneous sensor (having both outputs) were used, potential errors in one signal would result in inaccurate correction of the other signal.

In other words, if one follows the approach suggested by the Rejection, a paradoxical system results. Namely, one has to assume that the sensor is working properly in order to make corrections for when that same sensor is working improperly. Surely one skilled in the art would not be motivated to create a system that corrects an erroneous sensor based on information from that same erroneous sensor. This is especially true when the prior art gives no guidance how to resolve this problem and reconcile the teachings of the prior art.

Only Applicants have recognized that it is possible to determine degradation in a downstream sensor providing both a first and second output without requiring a separate, additional, sensor. This is possible since Applicants' method does not correct the sensor, but simply determines degradation of the sensor. Such an approach is possible because Applicants have recognized the advantageous use of a sensor with combined first and second outputs, whereas this same feature thwarts the "corrective" approaches of the prior art.

Applicants submit that one skilled in the art would not reach the asserted combination since even if Suzuki et al. is combined with Miyata et al., there is no teaching of how to delete

sensor 31 and still provide a workable NOx sensor correction method with the first and second sensor outputs. In fact, this has to be the case, as it appears Suzuki et al. already utilize a NOx sensor of the type in Miyata et al.

The combination fails to show all claimed elements

In addition to being incompatible, the asserted prior art fails to show all claimed elements. Specifically, the Office action alleges that Suzuki et al. shows:

> wherein the controller further indicating whether predetermined engine operating conditions are present (steps 601 and 611 with YES answer), and in response to the determination, adjusting a fuel injection amount into the internal combustion engine based on the output of the downstream air-fuel ratio sensor (31) (lines 9-17 of column 11).

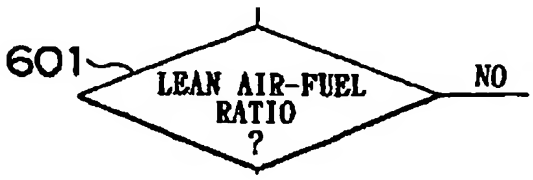
Thus, the Office action relies on three sources for showing this element: step 601, step 611, and lines 9-17 of Col. 11. Upon reviewing the cited Figure steps and description, Applicants fail to find any such disclosure. This is illustrated in detail below.

First, the cited disclosure at Col. 11, lines 9-17 states:

> Therefore, it is also possible to monitor the exhaust air-fuel ratio at the downstream side of the NOx-absorbing and reducing catalyst device 7 through the use of the downstream-side air-fuel ratio sensor 31 after the start of the reactivating operation while the engine is being operated under a constant condition and to determine that the NOx-absorbing and reducing catalyst device 7 has deteriorated, when the theoretical air-fuel ratio maintaining duration becomes shorter than a predetermined value.

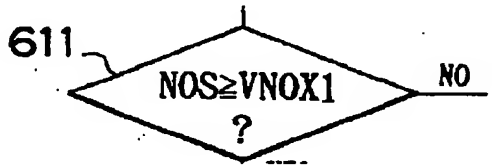
Applicants can find nothing that mentions adjusting fuel injection based on any sensor, let alone sensor 31. Rather, the cited disclosure simply mentions monitoring the exhaust air-fuel ratio at the downstream side of the catalyst 7 for determining that the catalyst has deteriorated when the air-fuel ratio maintaining duration become shorter than a predetermined value.

Second, step 601 of Figure 6 simply refers to determining whether the air-fuel ratio of the engine is lean. As shown below, Applicants can find nothing that mentions adjusting a fuel injection amount into the internal combustion engine based on an output of any sensor.



In step 601, the ECU 30 determines whether the engine 1 is being operated at a lean air-fuel ratio. If the engine 1 is not being operated at a lean air-fuel ratio (that is, when the engine 1 is being operated at a rich air-fuel ratio or the theoretical air-fuel ratio), there is no need to perform the operation of reactivating the NOx-absorbing and reducing catalyst device 7, so that the ECU 30 immediately ends the routine.

Third, step 611 of Figure 6 is also of no avail, since it in fact shows something quite different from what the Office action asserts. In particular, step 611 reads a corrected NOx sensor value from the NOx sensor, not the air-fuel ratio measured by sensor 31.



Subsequently in step 611, the ECU 30 determines whether the operation of reactivating the NOx-absorbing and reducing catalyst device 7 based on the corrected output value NOS is needed, that is, whether the corrected value NOS is equal to or greater than the predetermined value VNOX1. If NOS≧VNOX1 (meaning that the reactivating operation is needed), the ECU 30 proceeds to step 613, in which the ECU 30 sets the value of a reactivating operation execution flag XRS to "1". The ECU 30 then ends the routine.

As such, close inspection of each location cited in Suzuki et al. shows that Suzuki et al. fails to show a controller indicating whether predetermined engine operating conditions are present, and in response to said determination, adjusting a fuel injection amount into the internal combustion engine based on a second output of the sensor. Rather, it appears that Suzuki et al. utilize the downstream air-fuel sensor (31) to determine degradation of the catalyst, not to adjust fuel injection.

As such, the rejection of claim 18 should be withdrawn.

Claim 23

Regarding Claim 23, the Office action again relies on Suzuki et al., and supplements admittedly missing disclosure with Official Notice. First, Applicants hereby object to the use of Official Notice, especially since this was a new ground of rejection made final. Specifically, Applicants respectfully submit that such practice is discouraged by MPEP § 2144.03 A, which states that "[w]hile 'official notice' may be relied on, these circumstances should be rare when an application is under final rejection..."

Nevertheless, in an attempt to advance the prosecution of the subject application, Applicants' Claim 23 has been amended to indicate that the determination of a difference of the output value of the NOx sensor from a predetermined value is made under preselected engine operating conditions, which at least include during stoichiometric operating conditions. In other words, it may be possible to identify degradation from a difference determined during various operating conditions, including stoichiometric conditions.

Contrary to this approach, the cited reference of Suzuki et al. requires that the engine is operated in a condition in which the NOx concentration of exhaust gas flowing out of the NOx adsorbing and reducing catalyst device becomes substantially zero. As described beginning at Column 12, line 6, Suzuki et al. determine this condition when: the catalyst device is not deteriorated, the catalyst device temperature is within a predetermined range, and "a lean-air-fuel ratio and low-load operation is being performed or a fuel cut operation has continued for a predetermined length of time." As such, Applicants can find no description in Suzuki et al. of determining any difference in the NOx sensor at least during stoichiometric operating conditions.

Therefore, Applicants respectfully request that the rejection of claim 23 be withdrawn.

Conclusion

Based on the foregoing comments, the above-identified application is believed to be in condition for allowance, and such allowance is courteously solicited. If any further amendment is necessary to advance prosecution and place this case in allowable condition, the Examiner is courteously requested to contact the undersigned by fax or telephone at the number listed below.

Please charge any cost incurred in the filing of this Amendment, along with any other costs, to Deposit Account No. 06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505. A duplicate copy of this sheet is enclosed.

CERTIFICATE OF FACSIMILE

I hereby certify that this correspondence is being sent to the U.S. Patent and Trademark Office via facsimile to (703) 872-9306 on May 19, 2005.

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Respectfully submitted,

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